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Raster Graphics Validation

Frankie E. Spielman

U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Institute of Standards
and Technology
Gaithersburg, MD 20899

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May 1992



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RASTER GRAPHICS VALIDATION

Frankie E. Spielman

ABSTRACT

This publication describes the guidelines for establishing and managing raster graphics validations which include both conformance testing and the issuing of a certificate of validation. Raster graphics validation is intended to support the National Institute of Standards and Technology (NIST) initiative to validate raster graphics products for conformance to Federal Information Processing Standard (FIPS) Publication 150, Planned FIPS(Raster DAP)¹, Department of Defense (DoD) Computer-aided Acquisition and Logistic Support (CALS) Military Standard MIL-STD-1840, and DoD Specification MIL-R-28002.

This publication is divided into three functional documents needed to support raster graphics validation: Policy and Procedures; Description of Requirements; and Instructions and Forms. The Policy and Procedures document provides the operating policy and procedures that are to be followed in administering validations. The Description of Requirements document describes the conformance testing environment including the testing system software and procedure for executing the conformance testing system. The Instructions and Forms document contains the instructions, forms, and information necessary for a testing laboratory to test and report on a raster graphics product.

The inclusion or omission of a particular company or product does not imply either endorsement or criticism by the National Institute of Standards and Technology.

Key words: CALS, conformance testing, conformance testing instructions, conformance testing forms, conformance testing laboratories, raster graphics, testing procedures, testing requirements, validation, validation policy.

¹In the Planned FIPS(Raster DAP), Open Document Architecture (ODA) Raster Document Application Profile (DAP), NIST plans to propose adopting Part 23 of NIST Special Publication 500-202, Stable Implementation Agreements for Open Systems Interconnection Protocols. The ODA Raster DAP defined in part 23 specifies the functional subset of the ODA base standard to be used for the encoding of raster graphics files (Type II). Validation of raster graphics products can begin upon adoption of this FIPS.

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EXECUTIVE SUMMARY

This publication supports the raster graphics validation program, including conformance testing, that is being developed by the National Institute of Standards and Technology (NIST) and Department of Defense (DoD). Within DoD, the Office of the Secretary of Defense for Production and Logistics has the responsibility for coordinating raster graphics testing under the Computer-aided Acquisition and Logistic Support (CALs) initiative.

The testing of raster graphics processors to determine the degree to which they conform to the Federal Information Processing Standards (FIPS) may be required by government departments and agencies. Government departments and agencies may identify validation as a part of their procurement requirements. One of the CALs objectives is to coordinate the testing of implementations to determine the degree to which they comply with DoD standards and specifications. In this effort, there is a close parallel between testing for compliance to FIPS and testing for compliance to the DoD standards and specifications.

NIST has been funded by CALs to develop a conformance testing program for various standards including raster graphics conformance testing. In February 1991, NISTIR 4524, Raster Graphics Conformance Testing, was published which evaluated the alternatives for identifying and selecting a raster graphics conformance testing laboratory. As a follow-on to the earlier publication, this publication, Raster Graphics Validation, describes the guidelines for establishing and managing a raster graphics validation program. Validation is the process of checking the conformity of an implementation of a standard to its standard specification through conformance testing, and when compliance is demonstrated, issuing a certificate of validation. Conformance testing is the testing of a candidate product for the existence of specific characteristics required by a standard.

This publication comprises the deliverables in support of the CALs initiative for 1991. It is divided into three functional documents needed to support raster graphics validation: Policy and Procedures; Description of Requirements; and Instructions and Forms. The Policy and Procedures document provides the operating policy and procedures that are to be followed in administering validations. The Description of Requirements document describes the conformance testing environment including the testing system software and procedure for executing the conformance testing system. The Instructions and Forms document contains the instructions, forms, and information necessary for a conformance testing laboratory to test and report on a raster graphics product. The Description of Requirements and Instructions and Forms documents supersede Annexes A and B of NISTIR 4524.

TABLE OF CONTENTS

ABSTRACT	iii
ACKNOWLEDGEMENTS	iv
EXECUTIVE SUMMARY	v
VALIDATION POLICY AND PROCEDURES	1
1 INTRODUCTION	1
1.1 Purpose	1
1.2 Background	1
1.3 Raster Graphics Validation Services	2
2 DEFINITIONS	3
2.1 Acronyms	3
2.2 Terms	3
3 SCOPE OF VALIDATION	5
4 RECOGNITION OF PRODUCTS	5
4.1 Certificate of Validation	5
4.1.1 Validation Certificate Criteria	6
4.1.2 Certificate of Validation Extension	6
4.1.3 Change of Client's Operating System Version	7
4.2 Conformance Testing System and Release Schedule	7
4.3 Retention of Validation Records	7
4.4 Validated Products List	7
4.5 Conformity Assurance	8
5 VALIDATION	8
5.1 Overview	8
5.2 Validation Criteria	8
6 REGISTRATION	9
6.1 Overview	9
6.2 Registration Criteria	9
6.3 Registration Procedures	10
7 VALIDATION PROCEDURES	11
7.1 Requests for Validation	11
7.2 Validation Process	11
7.3 Documentation	12
8 MISCELLANEOUS	13
8.1 Funding (Reimbursement)	13
8.2 Confidentiality and Release of Information	13
8.3 Publication	13
CONFORMANCE TESTING DESCRIPTION OF REQUIREMENTS	17
1 INTRODUCTION	17
1.1 Purpose	17
1.2 Background	17
1.3 Standards and Specifications	17
2 DEFINITIONS	18

3	CONFORMANCE TESTING ENVIRONMENT	19
3.1	Scope	19
3.1.1	Type I Conformance Testing System	19
3.1.2	Type II Conformance Testing System	19
3.1.3	Conformance Testing Procedure	20
3.2	Testing Approach	21
3.3	Features to be tested	22
3.3.1	FIPS PUB 150	22
3.3.2	Planned FIPS(Raster DAP)	23
3.3.3	MIL-R-28002	24
3.3.4	MIL-STD-1840	24
3.4	Features Not to be Tested	25
3.5	Testing Environment Limitations and Modifications	25
4	GENERAL CONFORMANCE TESTING PROCESS	26
5	REPORTING REQUIREMENTS	27
5.1	Validation Summary Report (VSR)	27
5.2	Issuing the VSR	29
6	SEQUENCE OF TESTING EVENTS	29
	CONFORMANCE TESTING INSTRUCTIONS AND FORMS	35
1	INVENTORY	35
2	INTRODUCTION	35
3	TESTING PROCEDURE	36
3.1	Initial Transfer of File Set #1	36
3.2	Encoding and Compression of File Set #1	37
3.3	Initial Transfer of File Set #2	37
3.4	Decoding and Decompression of File Set #2	37
3.5	Final Transfer of File Sets #1 and #2	37
3.6	Completion of Report Forms	38
4	TEST PACKAGE RETURN	38

LIST OF FIGURES

Figure 1 - Validation and Conformance Testing	3
Figure 2 - Request for Raster Graphics Validation	15
Figure 3 - Declaration File	30
Figure 4 - Raster Data File Header Records	32
Figure 5 - Raster Graphics Conformance Testing	33

LIST OF FORMS

Request for Validation	15
Conformance Testing Specification	39
Conformance Testing Release Authorization	40
Conformance Testing Log	41
Conformance Testing Incident Report	42
Conformance Testing Processed Files	43
Conformance Testing Results File	44
Supplier's Declaration of Conformance	45
Conformance Testing Specification	46
Conformance Testing Release Authorization	47
Conformance Testing Log	48
Conformance Testing Log	49
Conformance Testing Log	50
Conformance Testing Log	51
Conformance Testing Incident Report	52
Conformance Testing Incident Report	53
Conformance Testing Incident Report	54
Conformance Testing Processed Files	55
Conformance Testing Results File	56

VALIDATION POLICY AND PROCEDURES

1 INTRODUCTION

1.1 Purpose

This document provides operating policy and general procedures that are to be followed in administering the Computer Systems Laboratory's (CSL) validation program for raster graphics processors. Detailed procedures are defined in the Instructions and Forms document.

1.2 Background

CSL of the National Institute of Standards and Technology (NIST) is responsible for establishing validation programs for Federal Information Processing Standards (FIPS). In carrying out this responsibility, CSL specifies the necessary conformance test specifications, test methods (i.e., test suites, test tools and technical procedures), validation procedures, and testing laboratories for testing product compliance to FIPS.

Validating implementations to determine the degree to which they conform to the Federal and DoD standards facilitates the acceptance and adoption of standards. Validation of products gives the users confidence in the product's capability to do what it is intended to do. Validation aids the users in purchasing off-the-shelf products that work together and conform to the standards thus facilitating interoperability and effective use of information systems.

The testing of raster graphics processors to determine the degree to which they conform to the Federal standards may be required by government departments and agencies. Government departments and agencies may identify validation as a part of their procurement requirements. Guidance on specifying FIPS and validation for FIPS may be found in the Federal Information Resources Management Regulation (FIRMR) 201-20.303, 201-20.304, and 201-39.1002, and the associate Federal ADP and Telecommunications Standards Index.

As a part of its mission, CSL plans to provide raster graphics processor validations for products supporting FIPS PUB 150 and, in the future, Planned FIPS(Raster DAP).

CSL also supports a CALS objective to coordinate the testing of implementations to determine the degree to which they comply with DoD standards and specifications.

1.3 Raster Graphics Validation Services

CSL is responsible for raster graphics processor validation for FIPS. A validation program is being established to fulfill this responsibility.

There are two different representations for the interchange of raster graphics data, Type I and Type II. Type I data is simply CCITT T.6 encoded data of a raster graphics image. FIPS PUB 150, Telecommunications: Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus (CCITT T.6), specifies the algorithm to be used for encoding Type I data. Type II data is encoded as an Open Document Architecture (ODA)² style document. The specification for Type II data is in NIST Special Publication 500-202, Stable Implementation Agreements for Open Systems Interconnection Protocols, Part 23, ODA Raster DAP (Planned FIPS(Raster DAP)).

Additionally, the Computer-aided Acquisition and Logistic Support (CALS) Executive Office of the Department of Defense (DoD) requires that all raster image files delivered to DoD comply with the requirements of FIPS PUB 150, MIL-STD-1840, and MIL-R-28002 (which includes the ODA Raster DAP).

For raster graphics processor validation, there are no known validations currently being performed by any other validation organization. However, the Canadian Government Department of Communications (DOC) and the UK National Computing Centre (NCC) are collaborating on an effort to develop a set of conformance testing tools and testing procedures for ODA. These tools and procedures may functionally cover Type I and Type II requirements.

Validation is the process of checking the conformity of an implementation of a standard to its standard specification through conformance testing, and when compliance is demonstrated, issuing a certificate of validation. Conformance testing is the testing of a candidate product for the existence of specific characteristics required by a standard, that is, testing the extent to which a particular product is a conforming implementation. Conformance testing is a part of validation. The relationship between validation and conformance testing is illustrated in figure 1.

²"Office" in the title of the ISO 8613 standard has been changed to "Open." Future documents will be updated to reflect this change. Existing documents may still contain "Office" in the title.

Products that have successfully completed a validation will be added to a *NIST Validated Products List*. The *NIST Validated Products List* may also include an annotation that the product operates on other computer environments provided that the vendor has satisfied specific registration criteria and followed registration procedures.

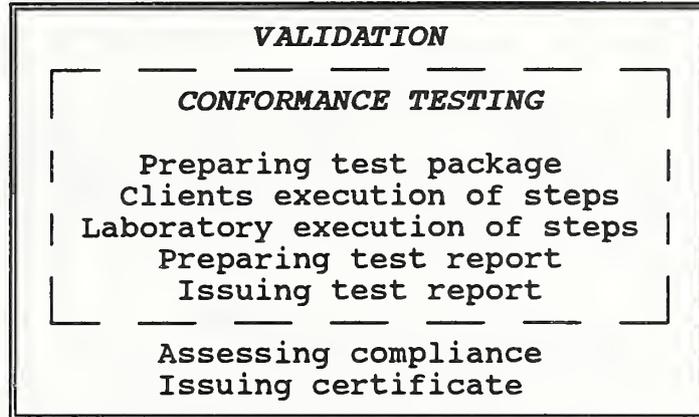


Figure 1 - Validation and Conformance Testing

2 DEFINITIONS

2.1 Acronyms

Certain acronyms are used throughout this document. The following is a list of the acronyms used and their full title:

- ANSI - American National Standards Institute
- CCITT - International Consultative Committee for Telegraphy and Telephony
- CALS - Computer-aided Acquisition and Logistic Support
- CSL - Computer Systems Laboratory
- DoD - Department of Defense
- FIPS - Federal Information Processing Standard
- IUT - Implementation Under Test
- NIST - National Institute of Standards and Technology
- SUT - System Under Test
- VSR - Validation Summary Report

2.2 Terms

Certain terms are used throughout this document. The following is a list of the terms and their respective descriptions:

Certificate of Validation - A document issued by NIST under the rules of the Raster Graphics Validation Policy and Procedures document indicating that adequate confidence is provided that an implementation under test is in conformity with a specific standard specification.

Client - The vendor or customer responsible for an implementation under test (product) that is to be tested for conformity with a specific standard or technical specification.

Conformance Testing - The testing of a candidate implementation under test for the existence of specific characteristics required by a standard; testing the extent to which a particular implementation under test is a conforming implementation.

Conformance Testing Laboratory - The laboratory responsible for executing conformance testing³.

Conformance Testing System - The hardware/software system used to test an implementation under test for conformity to a standard. For this document, it is the testing of conformity to raster graphics standards.

Implementation Under Test (IUT) - That part of a product which is to be studied under testing for one or more characteristics of the standard specification. For this document, it is a raster graphics processor.

Raster Graphics Processor - A processor (hardware and/or software) that either encodes raster graphics images in a format suitable for interchange or decodes interchanged files.

System Under Test (SUT) - The computer hardware, software, and communication network required to support the implementation under test.

Validation - The process of checking the conformity of an implementation of a standard to its standard specification through conformance testing, and when compliance is demonstrated, issuing a certificate of validation.

³NIST is responsible for authorizing an organization to conduct conformance testing. The organization must be formally recognized via an accreditation process conducted by NIST.

Validation Summary Report (VSR) - a report containing information gathered during the validation process which summarizes the results of conformance testing for a specific implementation under test.

3 SCOPE OF VALIDATION

The results of a validation will apply to the raster graphics processor and its operating environment. The implementor of a raster graphics processor will identify the raster graphics processor, hereafter referred to as Implementation Under Test (IUT), and its version or release. The implementor will also identify the operating system version or release, the pertinent supporting software, and the hardware systems, hereafter referred to as System Under Test (SUT), to be used in a given validation.

Validation focuses on testing an IUT using a test suite which consists of data instances (files) representing different raster graphics images. Validation determines if a client's IUT is capable of both generating (compressing/encoding) and receiving (decompressing/decoding) raster graphics images in accordance with FIPS PUB 150 and Planned FIPS(Raster DAP) (Type II only). A client uses a conformance test package consisting of the test suite, instructions, and forms to generate output files. A conformance testing laboratory analyzes the client's output and prepares a summary report. CSL evaluates the summary report to determine IUT compliance and issues a certificate of validation.

The scope of a validation is entirely different between Type I and Type II data. For Type I, all features of the CCITT T.6 compression algorithm specified in FIPS PUB 150 will be tested. For Type II, all features specified in FIPS 150 will be tested as well as the Office Document Interchange Format (ODIF) data stream specification stipulated in Planned FIPS(Raster DAP).

Secondarily, validation will also assess whether the raster headers contain the proper image processing information as required by MIL-STD-1840 and MIL-R-28002.

4 RECOGNITION OF PRODUCTS

4.1 Certificate of Validation

A Certificate of Validation will be issued by CSL if the IUT demonstrates conformance to the raster graphics FIPS standards. A Validation Summary Report (VSR) which shows the results of testing will be prepared for the specific IUT. This report together with

other information gathered during the validation process and the criteria defined in paragraph 4.1.1 are the basis upon which a Certificate of Validation may be issued.

The VSR will also indicate whether the raster header records are in compliance with MIL-STD-1840/MIL-R-28002. Criteria for the test method and tools for these DoD standards must be approved by NIST and DoD before military standard certificates can be issued.

The Certificate of Validation identifies the applicable IUT, the FIPS tested, and the client's SUT. The Certificate of Validation will not be issued if any IUT nonconformance was detected.

The Certificate of Validation will be valid one year, regardless of subsequent conformance testing system releases. At the conclusion of the one year, the client must renew the Certificate of Validation by either revalidating the IUT or requesting an extension of the certificate as discussed in 4.1.2.

4.1.1 Validation Certificate Criteria

A CSL Certificate of Validation is issued for an IUT if all of the following criteria are met:

- a. The IUT has been tested with the latest official release of the conformance testing system and with data instances (cases) that test all features of the raster graphics standards;
- b. A final VSR has been prepared reporting the results of the conformance testing;
- c. All IUT deviations from the standard have been corrected prior to completion of the conformance testing. If the IUT is modified during conformance testing, all tests of the conformance test suite are rerun with the corrected IUT; and
- d. All conformance testing steps have been completed.

4.1.2 Certificate of Validation Extension

The requirement for revalidation may be waived and the Certificate of Validation extended at the option of CSL if all of the following criteria are met:

- a. The last validation showed the subject IUT contained no errors;
- b. The client certifies to CSL that no changes have been made to either the IUT or SUT; and

- c. The IUT has been validated with the latest official conformance testing system release.

4.1.3 Change of Client's Operating System Version

The same rationale as in paragraph 4.1.2 above applies to changes in the client's operating system version used during the validation. If continuing maintenance changes to the subject operating system and pertinent supportive software have been made, then revalidation may be appropriate.

4.2 Conformance Testing System and Release Schedule

Changes may be required to the conformance testing system to correct existing errors, enhance test routines, and reflect new specification interpretations.

A new release or version of a conformance testing system shall be issued when significant changes warrant. A new release or version of the conformance testing system shall not be used in a validation until the announced effective date.

4.3 Retention of Validation Records

The records and information used in preparing the VSR will be retained for one year by the Conformance Testing Laboratory after completion of the final VSR.

4.4 Validated Products List

CSL publishes, on a quarterly basis, a list of validated processors having a current validation certificate or registered validation report (see section 6). The VSR will be listed in this publication. This list will identify the IUT, SUT, expiration date, and other pertinent information.

The *NIST Validated Products List* (order number PB91-937300) may be obtained by request from:

National Technical Information Service (NTIS)
U.S. Department of Commerce
5285 Port Royal Road
Springfield, VA 22161

Subscriptions: (703) 487-4630
Individual copies: (703) 487-4650

4.5 Conformity Assurance

The policy and procedures described in this document provides for two types of assurance regarding conformance to the standard. The first type is the conformity assurance provided by an accredited testing laboratory that results in a certificate being issued for the IUT executed within a specific SUT environment. The second type is the conformity assurance offered by the client based on the client's declaration of conformance for the IUT implemented on other SUTs. The first type of assurance is referred to as validation (see Section 5) and the second type of assurance is referred to as registration (see Section 6).

5 VALIDATION

5.1 Overview

The process for validation consists of an accredited testing laboratory reviewing the client's testing procedures, running conformance tests consisting of an adequate number of test cases, evaluating the test results, and reporting the results of that testing in a VSR. If the validation procedures are followed and the VSR shows that the IUT demonstrated conformance to the standards, a Certificate of Validation is issued to the client of the IUT based on the specified SUT.

5.2 Validation Criteria

For the IUT to be validated, it shall be tested:

- a. With the latest version of the conformance testing system. All IUTs tested with the previous version of the conformance testing system must be retested with the current version when the validation certificate expires;
- b. Under the manufacturer's uniquely named operating system (e.g., IBM OS/2 and DOS are different operating systems). The unique identification of the operating system used during conformance testing and described in the VSR must be specific and include complete versioning nomenclature of the operating system;
- c. Under each unique computer (hardware) architecture (e.g., Motorola 68xxx and Intel 80xxx are different computer architectures). The unique identification of the computer used during conformance testing and described in the VSR should be specific and include complete hardware nomenclature of the computer;

- d. For each new release of a vendor's programming language compiler used to compile programs that are a part of the IUT; and
- e. For each new market release of the IUT upon expiration of the Certificate of Validation.

6 REGISTRATION

6.1 Overview

When an IUT is validated for conformance to the standard, the determination of acceptable test results is based on conformance testing of the IUT on a specific SUT. The purpose of the procedures in this section is to permit the client to register (i.e., list in the *NIST Validated Products List*) an implementation on other computer system environments along with the validated IUT that the client claims are equivalent based on the client's self-testing.

An implementation may be registered for processing on other computer system environments based on the client's in-house testing and declaration of conformity providing the client has previously completed a successful or is currently completing conformance testing by an accredited testing laboratory.

For implementations on other computer system environments to become registered in the *NIST Validated Products List*, the client must submit a *Supplier's Declaration of Conformance*. By signing this declaration, the client certifies that the implementation, when implemented on the named computer system environments, is the same binary level implementation and produces the same conforming test results as that provided during initial validation of the IUT. This declaration must indicate the client's support of the implementation on the named computer system environments.

The client's statement is his written assurance that based on self-testing, the implementation is a standard conforming implementation in the named computer system operating environments. This statement shall be included or added to the VSR prepared during validation.

6.2 Registration Criteria

Implementations used on other computer system environments which may be registered include:

a. Other releases/versions of the same operating system

Later releases/versions of the same operating system used during validation, which do not change the function or operation of the processor, may be registered.

b. Renamed or rebadged systems

Renamed or rebadged systems (one manufacturer's hardware or operating system is sold under another brand name) may be registered. Where the name is changed, evidence (manufacturer's statement, sales literature, etc.) must be provided to support the fact that the hardware architecture or operating system is the same as the one that completed or is completing a validation. If appropriate evidence is not provided to the satisfaction of CSL then these environments need to be validated to be included in the Validation Products List.

c. Other models of the same manufacturer computer family

Other models of the same manufacturer's computer family having the same hardware architecture as the computer used during validation may be registered. The list of models shall be presented in one of two ways: as a distinct list of model designations (e.g., HP 9000 series Models 825, 835, 850); or as a family designation by model groups (e.g., IBM 43xx, 30xx, 93xx). When computer options (e.g., math co-processors) are required by the client, they must be included in the computer description.

d. Micro-processor based systems

Compatible computers using the same micro-processor architecture, where upward or downward hardware architecture compatibility has been maintained (e.g., Intel 8086, 80286, etc.), may be registered. For these computers to be listed, they must run the same operating system and be of the same micro-processor based architecture as that used for validation. Designation of these computer systems must be precise.

6.3 Registration Procedures

To register an implementation for processing on other computer system environments, the client must submit a request for registration. The client may submit the request at the time of the initial validation of the IUT or at a later date. With the

request, the client shall include a signed *Supplier's Declaration of Conformance*. The request must be submitted to CSL.

CSL will determine if the registration criteria were met and, if so, add the implementation to the *NIST Validated Products List* annotating that it is a registered implementation.

7 VALIDATION PROCEDURES

7.1 Requests for Validation

A request for validation should be submitted to CSL on the *Raster Graphics Request for Validation* form (see figure 2) available from CSL.

The *Raster Graphics Request for Validation* may be obtained by request from:

National Institute of Standards and Technology (NIST)
Computer Systems Laboratory
Raster Graphics Validation
Building 225, Room A266
Gaithersburg, MD 20899
Telephone (301) 975-3265

The *Raster Graphics Request for Validation* form is a formal request for raster graphics validation which constitutes the contract between CSL and the client and must be signed by the client before any work is undertaken.

On receipt of the completed form and payment, CSL coordinates a test with the Conformance Testing Laboratory, schedules the validation, and notifies the client.

7.2 Validation Process

The steps necessary to complete the validation of a client's IUT follows:

- a. Client submits the *Raster Graphics Request for Validation* form to CSL.
- b. CSL forwards a copy of the *Raster Graphics Request for Validation* to the Conformance Testing Laboratory with instructions to assemble and send to the client a conformance test package consisting of instructions, forms, and a test suite. The client must stipulate on the *Raster Graphics*

Request for Validation form whether the validation is for Type I or II data files.

- c. Using the instructions and forms received from the Conformance Testing Laboratory, the client processes the test suite through the IUT. The images in the test suite are processed into client output files. At the option of CSL, an observer may be assigned to monitor the client's processing of the test suite.
- d. The client sends the processed files to the Conformance Testing Laboratory for evaluation.
- e. The Conformance Testing Laboratory evaluates each of the returned files comparing them with the expected results. The Conformance Testing Laboratory determines whether all files have been processed without error and, if errors are encountered, documents them and notifies CSL and the client. The client may then decide to repeat the processing steps starting with "c" above after modifying the IUT.
- f. The Conformance Testing Laboratory prepares a VSR containing the results of the conformance testing.
- g. The Conformance Testing Laboratory forwards a copy of the VSR to the client and to CSL.
- h. The client has 30 days from the date the VSR is issued to review it and notify CSL in writing of any objections. Objections, along with associated rationale and detailed documentation will be reviewed by CSL and appropriate action will be taken. If there are no objections, the VSR will become final and be listed in the *Validated Products List*, which is published quarterly by NIST. CSL also issues a Certificate of Validation at this time. Federal agencies may use the *Validated Products List* for identifying implementations that have been tested and found to be compliant with the standards.

7.3 Documentation

The Conformance Testing Laboratory will create and maintain a client file consisting of the following documents:

- validation request,
- all correspondence,
- a record of all telephone conversations,
- a log of all the events occurring during the validation,
- description and/or copies of images in the test suite,

- all forms completed by the client, and
- all forms documenting the conformance assessment process.

The client file will be retained for one year after the final VSR is issued.

The VSR will be retained by CSL for a minimum of three years.

8 MISCELLANEOUS

8.1 Funding (Reimbursement)

The validation of the IUT is to be performed on a cost-reimbursement basis. The pricing information will be made available after determining the cost associated with administering the raster graphics validation program.

8.2 Confidentiality and Release of Information

Until the VSR is finalized, all information concerning the validation of the IUT is considered to be confidential. The client must state in writing any information which is to remain proprietary. Subject to disclosure under the Freedom of Information Act (5 U.S.C. 552), CSL and the Conformance Testing Laboratory will ensure that such proprietary information will not be disclosed, copied, reproduced, or otherwise made available in any form to any other person, firm, corporation, or other entity without the consent of the client.

CSL will not be liable for the disclosure of information designated as proprietary, which after notice to and consultation with the client, CSL determines that it may not lawfully be withheld or which a court of competent jurisdiction required disclosure.

8.3 Publication

In general, CSL shall have the right to use all information gathered in the course of developing and administering validations for any governmental purpose but shall not release such information publicly except:

- a. when reporting on the results of testing, CSL may provide information subject to the provisions of the section on confidentiality (section 8.2); and
- b. CSL may release information where such release is required pursuant to a request under the Freedom of Information Act (5 U.S.C. Section 552).

VSRs shall be made available to the public through CSL. In no event, however, shall any proprietary information be used in CSL publications without the client's prior written consent. The VSRs include a statement that the client should not reproduce the VSR except in full without the approval of CSL.

**RASTER GRAPHICS
Request for Validation**

Company Name: _____ Date: _____

Primary Contact

Technical Representative

Name: _____

Title: _____

Phone: _____

Address: _____

Configuration Information

Type of Data: I or II (Circle one)

Implementation Under Test (IUT) -

Hardware: _____ Software: _____

Version/Release ID: _____ Release Date: _____

Chip Manufacturer: _____ Chip Number: _____

System Under Test (SUT) -

Host Computer Mfr: _____ Model: _____

Operating System: _____

Other device interfaces: _____
(Attach additional documentation to describe different interfaces)

FOR NIST USE ONLY

Client Request Number: _____

Assigned to: _____ Date: _____

Figure 2 - Request for Raster Graphics Validation

CONFORMANCE TESTING DESCRIPTION OF REQUIREMENTS

1 INTRODUCTION

1.1 Purpose

This document describes the requirements for a conformance testing system to be used by CSL in validating raster graphics processors. CSL is responsible for authorizing an organization to conduct conformance testing using the conformance testing system.

1.2 Background

Conformance testing is the testing of a candidate product for the existence of specific characteristics required by a standard, that is, testing the extent to which a particular product is a conforming implementation.

A conformance testing system is a suite of hardware and software tools. In typical conformance testing environments, the conformance testing software and a series of individual test cases (data instances) called a test suite are part of the conformance test package. The client executes the conformance testing software testing the IUT using the test suite from the conformance test package. However in other situations, such as the raster graphics conformance testing, the test suite in the conformance test package includes only data instances. The conformance testing software is executed only at a NIST-approved testing laboratory.

The software tools for the conformance testing system focus on testing instances of raster graphics files to determine if a client's IUT is capable of both generating and receiving encoded raster graphics images. This is done by building test suites consisting of an adequate number of instances to thoroughly test all the unique combinations of features identified in the standard specifications.

1.3 Standards and Specifications

FIPS PUB 150, Telecommunications: Facsimile Coding Schemes and Coding Control Functions for Group 4 Facsimile Apparatus, adopts Electronic Industries Association (EIA) Standard EIA-538-1988 which defines the facsimile coding schemes and their control functions for Group 4 facsimile apparatus. EIA-538-1988 is functionally equivalent to CCITT Recommendation T.6. EIA-538 defines a standard compression algorithm for compressing bi-tonal raster graphics images. This standard does not specify information needed to process the image such as line dimensions or orientation. The

specification of this header type of information must be specified in other standards.

Planned FIPS(Raster DAP), Open Document Architecture (ODA) Raster Document Application Profile (DAP), adopts Part 23 of NIST Special Publication 500-202, Stable Implementation Agreements for Open Systems Interconnection Protocols. The ODA Raster DAP defined in part 23 specifies the functional subset of the ODA base standard to be used for the encoding of raster graphics files (Type II). It specifies an interchange format suitable for transfer of structured documents between equipment designed for raster processing. The ODA Raster DAP supports only raster graphics content specifically excluding character and vector graphics content. This standard does specify all of the information needed to process the image such as line dimensions or orientation.

MIL-R-28002, Military Specification, Requirements for Raster Graphics Representation in Binary Format, defines the structure and encoding of raster graphics files to be delivered to DoD. It can also serve as a means for standard interchange between private contractors and non-DoD organizations. MIL-R-28002 was created with the storage and interchange of scanned engineering drawings in mind, but applies to other documents as well, such as technical manuals and illustrations in raster form.

MIL-R-28002 describes two different representations for interchanging raster graphics data: Type I and Type II. Type I data is simply CCITT T.6 encoded data of a raster graphics image enclosed within MIL-STD-1840 header information. Type II data is a MIL-STD-1840 header wrapped around an Open Document Architecture (ODA) style document.

MIL-STD-1840, Military Standard, Automated Interchange of Technical Information, standardizes the format and structure of digital technical data files for the purpose of interchange between organizations or systems. For raster files, it describes a file header to be placed ahead of any raster data specified by MIL-R-28002.

2 DEFINITIONS

Terms and acronyms used throughout this document are described in the Policy and Procedures document, section 2, page 3.

3 CONFORMANCE TESTING ENVIRONMENT

3.1 Scope

The conformance testing environment will include two aspects, the conformance testing systems and the conformance testing procedure.

The conformance testing procedure is the set of procedures for conducting the conformance testing of a client's IUT. The conformance testing systems are the automated software tools used to perform the testing. The Conformance Testing Laboratory will conduct the conformance testing procedure using the conformance testing systems.

Conformance testing for raster graphics requires two conformance testing systems, Type I and Type II. The Type I system is a subset of the Type II system.

3.1.1 Type I Conformance Testing System

The first conformance testing system defined in this document will test instances of Type I raster graphics files for conformance to the standards. Specifically, it must meet the following four requirements:

- (1) test client's IUT for conformance of compressed data files to FIPS PUB 150 (CCITT Recommendation T.6);
- (2) test client's IUT for capability to recognize CCITT T.6 compressed files that conform to FIPS PUB 150;
- (3) verify structure of Type I data files as defined in MIL-R-28002; and
- (4) verify definitions of raster header records as defined in MIL-STD-1840.

3.1.2 Type II Conformance Testing System

The second conformance testing system defined in this document will test instances of Type II raster graphics files for conformance to the standards. Specifically, it must meet the requirements for Type I data described above plus the following two requirements:

- (1) test client's IUT for conformance to the ODIF data stream; and
- (2) test client's IUT for capability to recognize and parse an ODIF data stream.

3.1.3 Conformance Testing Procedure

The conformance testing procedure will include the following functions:

(1) Analysis and preparation of validation material (prevalidation):

- a. Identify client requirements to be accomplished during the conformance testing procedure including the identification of the type of data (Type I or Type II).
- b. Identify any deviation in procedures or technical matters that are not in accordance with written and established conformance testing procedures (Policy and Procedures).
- c. Contact the client to review the conformance testing procedures.
- d. Discuss possible problem areas concerning conformance testing with the client. Ensure that the client is made aware of all the CSL validation requirements. Coordinate with CSL if problems cannot be resolved or if CSL conformance testing requirements are not being followed.
- e. Establish a conformance test schedule in coordination with the client, unless conformance test dates were previously arranged between the client and CSL and were submitted to the Conformance Testing Laboratory with the *Raster Graphics Request for Validation* form.
- f. Identify the test images to be included in each set (encoded and bitmap) of data.
- g. Execute software tools required to prepare the test data and prepare the conformance test package which includes the test data and the accompanying *Raster Graphics Conformance Testing Instructions and Forms* document.
- h. Mail the conformance test package to the client.

(2) Provide client consultation as required to assist the client through the conformance testing of the client's IUT.

- (3) Evaluate the conformance testing results:
 - a. Review the results of the client's execution of the conformance test package.
 - b. Review and evaluate any incident reports for potential problems.
 - c. Execute the conformance testing system software tools to evaluate the conformance test material. These tools compare the client's output data with the expected output, process the client's output data as required, and generate computer listings for annexes to the VSR. Specifically, the client's encoded images will be compared to the laboratory's encoded versions of the original binary bitmap images and the client's bitmap images will be compared to the laboratory's bitmap images. This procedure verifies the correctness of the encoding and compression/decompression algorithm.
 - d. Analyze each problem (if any) to determine the exact cause of the deviation and to determine if the problem is a valid encoding/decoding error. Use the CCITT, ANSI, and FIPS standards, Raster Graphics Validation Policy and Procedures, Raster Graphics Validation Description of Requirements, and software tools as required in analyzing problems. If an apparent error in a conformance test is discovered, notify CSL and the client.
 - e. Deliver to CSL the client's signed Declaration of Conformance, accurately describing the client's hardware/software environment and the conformance testing environment.
- (1) Prepare a VSR in accordance with section 5.

3.2 Testing Approach

The results of a conformance test will apply to the IUT and its SUT. The implementor of an IUT will identify the IUT, its version or release, and the SUT to be used in a given conformance test.

Conformance testing will focus on testing data instances (data files) of raster graphics files to determine if a client's IUT is capable of both generating (compressing/encoding) and receiving (decompressing/decoding) raster graphics images in accordance with FIPS PUB 150 and Planned FIPS(Raster DAP) (Type II only). This is

accomplished by building test suites consisting of an adequate number of instances to thoroughly test all the unique combinations of features identified in the standards. The conformance testing system operated by a Conformance Testing Laboratory will test a client's system through the interchange of data files between the Conformance Testing Laboratory and the client. The Conformance Testing Laboratory must first of all select the appropriate data files, bundle them into a conformance test package along with the instructions and forms, and send the conformance test package to the client. The client processes the data files from the conformance test package creating output files and sending the processed files back to the Conformance Testing Laboratory for evaluation.

The features specified in the standards shall be tested using two sets of raster images. One set shall consist of binary bitmap (uncompressed) images; the other set shall be encoded according to the FIPS standards. Each set of images is designed to test the IUT's processing ability for a variety of different image sizes and coding situations. In general, the images will run from the simplest to the most complex. Images in the two sets will be similar but not identical.

3.3 Features to be tested

3.3.1 FIPS PUB 150

The test suite will be designed to verify the system's ability to process images under the following situations:

- page sizes from A through K (North American), and A4 through A0 (Metric)
 - o testing will include only standard image sizes, except that fewer than the number of standard lines may be used to reduce testing time and resources
 - o every page width will be present in the test set, although every test size may not appear in each test set
- all permissible code words (all black run lengths, all white run lengths, all vertical and all pass modes)
- data with a maximum line length and a compression factor of less than one (negative compression)
- compressed images with incorrect encoding to check error recovery

- o error report should include location at which error was detected
- o images incorrectly encoded need not be returned as part of the processed test set

The images themselves may consist of scanned and/or computer generated images.

3.3.2 Planned FIPS(Raster DAP)

In addition to FIPS PUB 150 requirements, the test suite for Type II data will be designed to verify the system's ability to process images under the following situations (see 5.1 of ODA Raster DAP):

- the data stream shall be encoded in accordance with the ASN.1 encoding rules defined in ISO 8825
- the data stream shall be structured in accordance with the interchange format defined in 8.1 of the ODA Raster DAP
- the document shall be structured in accordance with only the formatted document class specified in clause 7 of the ODA Raster DAP
 - o all of the mandatory constituents (document profile, specific layout structure, and content portion description) must be present in the data stream
 - o at least two data streams but not all must include the optional constituent of presentation style
- correct encoding of the attributes associated with each constituent
 - o all of those attributes specified as required for each constituent must be present
 - o at least two data streams but not all must include the optional attributes for each constituent
- the attributes shall have values within the range of permissible values specified in the ODA Raster DAP
- the encoded document shall be structured in accordance with the ODA base standard
 - o the layout structure must include: document layout root, composite page(s), frame, and block objects

- o if multiple pages (images) are present, a frame and block must follow each page
 - o content description must be contained in the block layout object
- the document shall be encoded and structured in accordance with all characteristics defined in clause 6 of the ODA Raster DAP

3.3.3 MIL-R-28002

The *Raster Graphics Request for Validation* form specifies the type of encoding to be used (Type I or Type II). Each set of images shall constitute one document in accordance with MIL-STD-1840. Both documents may be stored on a single magnetic tape, or each document may be stored on a separate tape.

For testing of Type I raster data files, the Conformance Testing Laboratory will verify that a file encoded by the IUT has the properly encoded MIL-STD-1840 raster header records followed by the encoded raster image. The raster image must be encoded in accordance with FIPS PUB 150.

For testing of Type II raster data files, the Conformance Testing Laboratory will verify that a file encoded by the IUT has the properly encoded MIL-STD-1840 raster header records followed by the ODA style document. The raster image must be encoded in accordance with the Planned FIPS(Raster DAP) and FIPS PUB 150.

3.3.4 MIL-STD-1840

MIL-STD-1840 is to be used to standardize the format and structure of image interchange between the IUT and the Conformance Testing Laboratory. Only those features which have bearing upon image processing as defined in MIL-STD-1840 and MIL-R-28002 will be used; other features described in the MIL-STD-1840 are outside the province of raster image processing and will not be a part of the test.

The following features set forth in MIL-STD-1840 shall be used:

- magnetic tape format and naming conventions, as described in paragraphs 5.1.1, 5.1.3, and 5.2.1.
- document declaration file
 - o all 15 records must be present

- o all 15 records will be visually checked and the file count record verified for valid value (see figure 3)⁴
- raster data file header records
 - o all 11 records must be present
 - o all 11 records will be visually checked and the four records verified for valid values (see figure 4)⁵

3.4 Features Not to be Tested

The features of MIL-STD-1840 associated with document files other than raster graphics images will not be tested. The ability to convert between the standard CCITT T.6 compression algorithm and any other proprietary or non-standard compression algorithm will not be tested. Furthermore, ODA features that are not described in the ODA Raster DAP will not be tested.

3.5 Testing Environment Limitations and Modifications

For the purposes of this test, the following options set forth in MIL-STD-1840 and MIL-R-28002 shall apply:

- one 9-track magnetic tape density shall be used for the complete test
- image orientation shall be limited to 000,270 (portrait) or 090,270 (landscape) orientation
- record 7 in the raster data file headers must contain a '9' instead of a '1' or '2' if the image is a binary bitmap image; this is done in order to allow the identification of binary bitmap images.

Note: Using a type of '9' is NOT in accordance with MIL-STD-1840 and MIL-R-28002 and is to be used only for the purposes and duration of this test. This must be done to provide a mechanism for the

⁴ The Conformance Testing Laboratory will verify that the number of raster image files in the document interchange agrees with the "filcnt" record.

⁵ The Conformance Testing Laboratory will verify that the 'rtype', 'rorient', 'rpelcnt', and 'rdensity' records contain valid values for each image.

interchange of bitmap images. MIL-R-28002 does not permit this in a normal operational mode.

4 GENERAL CONFORMANCE TESTING PROCESS

The steps necessary to complete the conformance testing of a client's IUT follows:

- a. Client submits the *Raster Graphics Request for Validation* form to CSL. The client shall specify the testing environment and the type of encoding (Type I or II) to be tested.
- b. CSL instructs the Conformance Testing Laboratory to assemble and send to the client a conformance test package consisting of instructions, forms, and two sets of test cases formatted in accordance with MIL-STD-1840 and MIL-R-28002. The first set (or document) will consist of uncompressed, binary bitmap images of various sizes and contents. The second set will consist of images of various sizes and similar (though not identical) contents to the first set but will be compressed in accordance with FIPS PUB 150 (Type I and II) and encoded in accordance with FIPS(Raster DAP) (Type II only).
- c. Using the instructions and forms received from the Conformance Testing Laboratory, the client processes the test suite through the IUT. The set of bitmap images (set 1) are processed creating the client's version of the encoded files and the set of laboratory encoded files (set 2) are decoded/decompressed creating the client's version of the bitmap files. Both sets of these client processed images will then be formatted in accordance with MIL-STD-1840 and MIL-R-28002. At the option of CSL, an observer may be assigned to observe the client's processing of the test suite.
- d. The client sends the processed files to the Conformance Testing Laboratory for evaluation.
- e. The Conformance Testing Laboratory will evaluate each of the returned set of files comparing them with the expected results to determine if the client's IUT produced the expected results (see figure 5). The client's encoded images from set 1 will be compared to the laboratory's encoded versions of the original binary bitmap images. The client's bitmap images from set 2 will be compared to the laboratory's bitmap images. This procedure verifies the correctness of the encoding and compression/decompression algorithm, as well as the information contained in the raster data file header records regarding the image orientation, dimension, and pel density.

The results of this comparison will be evaluated and documented for inclusion in the VSR. The evaluation is based upon only the stated IUT configuration, and does not indicate what the system would produce under a different configuration.

- f. The Conformance Testing Laboratory prepares a VSR containing the results of the validation testing.

5 REPORTING REQUIREMENTS

5.1 Validation Summary Report (VSR)

The results of the testing performed by the Conformance Testing Laboratory on FIPS standards validation will be documented in a VSR. The Conformance Testing Laboratory will be responsible for preparing the report. CSL is responsible for issuing the report.

The report will contain at least the following information:

- o Supplier's Declaration of Conformance describing the client's encoding/compression and decoding/decompression processing environment;
- o Detailed description of the testing results which will include as a minimum the following:
 - pass/fail status;
 - description of the testing environment;
 - testing methodology and procedures used;
 - description of the images in the test suite, both the expected and unexpected results, and any inconclusive results,
 - total number of test runs,
 - for each image, run time statistics of the compression/decompression process showing the number of:
 - pels per line,
 - encoded lines,
 - occurrences for each code in the vertical mode,
 - occurrences for each group within the make-up mode
 - occurrences for each run length of the termination codes;

- for each Type II image, a display showing (if present) the attribute values for:
 - type-of-coding,
 - number-of-pels-per-line,
 - number-of-lines,
 - tiling-offset (if tiled),
 - tile-types (if tiled, one value per tile),
 - pel-path,
 - line-progression,
 - pel-spacing,
 - clipping
 - page-dimensions,
 - medium-type (nominal page size);
 - for each Type II file, a display showing the values for each attribute in the document profile, a complete list of attributes is shown in table D.3 of the ODA Raster DAP;
 - any additions to, deviations, or exclusions from the test case specifications;
 - disclosure of any non-standard test method or procedures used; and
 - a test discrepancy summary.
- o *Raster Graphics Request for Validation* form containing the following:
 - name and address of the client responsible for the IUT,
 - unique identification of the report,
 - name and address of the conformance testing laboratory,
 - description and identification of the raster interchange hardware/software, and
 - description and identification of the complete hardware/software testing environment.
 - o Any disclaimers
 - o Forms completed during the test

5.2 Issuing the VSR

The client has 30 days from the date the VSR is issued to review it and notify CSL in writing of any objections. Objections, along with associated rationale and detailed documentation will be reviewed by CSL and appropriate action will be taken. If there are no objections, the VSR will become final and be listed in the *Validated Products List*, which is published quarterly by NIST. Federal agencies may use the *Validated Products List* for identifying implementations that have been tested and found to be compliant with the standards.

6 SEQUENCE OF TESTING EVENTS

The sequence of conformance testing events should not exceed five months. The maximum number of days expected to complete each event is as follows:

- o CSL schedules the test - 7 days after receipt of the *Raster Graphics Request for Validation* form
- o Conformance Testing Laboratory delivers the conformance test package upon receipt of the request - 15 days
- o Client responsible for the IUT delivers test results - 30 days after receipt of the conformance test package
- o Conformance Testing Laboratory completes the VSR - 30 days after receipt of test results from client
- o CSL and client review the VSR - 30 days after receipt of the report from the Conformance Testing Laboratory
- o CSL adds client to *Validated Products List* - 30 days after issuing VSR (if no objections from client)

**Permissible Values for Document
Declaration File Records**

All 15 records in the document declaration file must be present. The following are provided: a list of the records and a description of each record's content, and a sample document declaration file.

srcsys:	Name and address of the sending organization; depending on who is preparing the tape, this record must contain the name and address of either the Conformance Testing Laboratory or the client responsible for the system being tested.
srcdocid:	This record must contain a test identification number, supplied by the Conformance Testing Laboratory.
srcrelid:	NONE
chglvl:	ORIGINAL, YYYYMMDD
dteis:	YYYYMMDD (this date should be the same as the date in the "chglvl" record)
dtsys:	Name and address of the sending organization; depending on who is preparing the tape, this record must contain the name and address of either the Conformance Testing Laboratory or the client responsible for the system being tested.
dstdocid:	This should be the test identification number, the same as in the "srcdocid" record.
dstrelid:	NONE
dtetrn:	YYYYMMDD (this is the date this document was transferred to magnetic tape)
dlvacc:	NONE
filcnt:	RNN (where NN = number of raster image files in this document)
ttlcls:	Unclassified
doccls:	Unclassified
doctyp:	Test Images
docttl:	Conformance Test Package

Figure 3 - Declaration File

Sample Document Declaration File

srcsys: Tested Systems, Inc., 123 Tester Drive, Philadelphia, PA 19191
srcdocid: 124C41
srcrelid: NONE
chglvl: ORIGINAL, 19890719
dteisu: 19890719
dstsys: Delta Information Systems, Horsham Business Center, 300 Welsh Road, Horsham,
PA 19044
dstdocid: 124C41
dstrelid: NONE
dtetrn: 19890721
dlvacc: NONE
filcnt: R13
ttlcls: Unclassified
doccls: Unclassified
doctyp: Test Images
docttl: Conformance Test Package

Figure 3 - Declaration File (Cont'd)

**Permissible Values for Raster
Data File Header Records**

All 11 records of the raster data file header records must be present. A description of the records and their valid contents follow.

srcdocid:	Refer to Paragraph 5.1.5 of MIL-STD-1840
dstdocid:	NONE
txtfilid:	NONE
figid:	NONE Note: In the draft MIL-STD-1840B, this record is being replaced by a "pntfilid" record, however, it is optional.
srcgph:	NONE
doccls:	NONE
rtype:	Contains a '1' for Type I compressed images, '2' for Type II encoded images, or a '9' for binary bitmap images
rorient:	Contains '000,270' for portrait, or '090,270' for landscape
rpelcnt:	NNNNNN,MMMMMM (NNNNNN = # pels / line, MMMMMM = lines per page)
rdensty:	0200 or 0300
notes:	This record may contain a comment, or 'NONE'.

Figure 4 - Raster Data File Header Records

Raster Graphics Conformance Testing

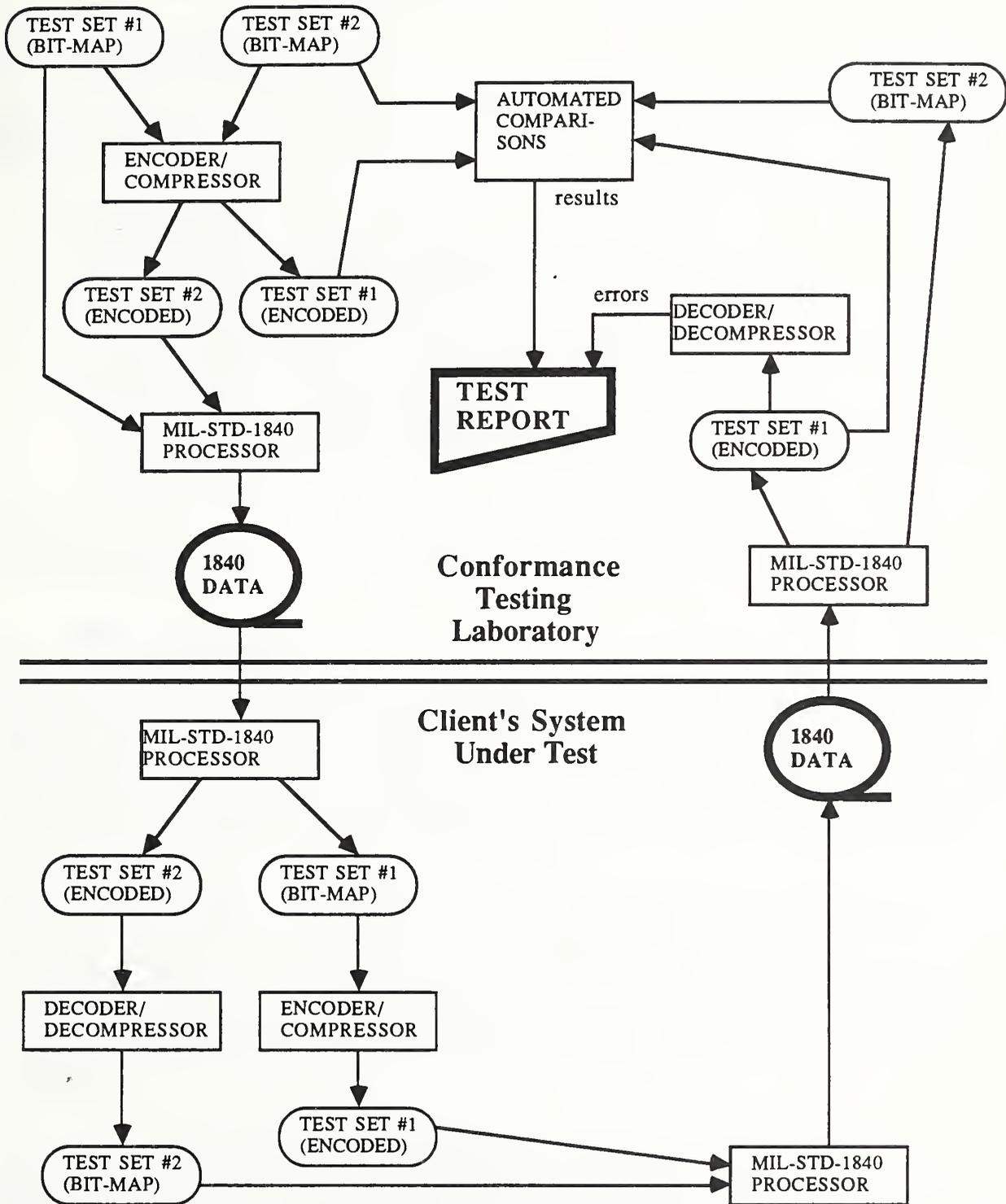


Figure 5 - Raster Graphics Conformance Testing Procedure

CONFORMANCE TESTING INSTRUCTIONS AND FORMS

1 INVENTORY

The following should be found in the Raster Graphics Conformance Test Package:

- 1 copy of Testing Procedure - Instructions and Forms (this document)
- 1 Conformance Testing Specification form
- 1 Conformance Testing Release Authorization form
- 1 Conformance Testing Log form
- 1 Conformance Testing Incident Report form
- 1 Conformance Testing Processed Files form
- 1 Conformance Testing Results File form
- 1 Supplier's Declaration of Conformance form
- 1 Sample packet of completed forms
- Reel(s) of 9-track magnetic tape recorded at 1600 or 6250 CPI density

If any item on this list is missing, please contact the Conformance Testing Laboratory immediately.

2 INTRODUCTION

This document contains the conformance testing instructions, forms, and information necessary to process the test images and complete the associated documentation forms and reports. The enclosed blank forms, especially the *Conformance Testing Log* and *Conformance Testing Incident Report* forms, may be photocopied as required. As part of the testing procedure, all actions taken must be recorded on the testing forms.

Each of the forms included with this package has a particular purpose and use in the VSR. The *Conformance Testing Specification* form is used to record a list of all files read from the tape(s). If the file is a raster file, the entry will also list the file type (compressed or uncompressed) and the image dimensions and orientation. A short description of the file's contents may also be included although this is not required.

The *Conformance Testing Release Authorization* form merely authorizes the Conformance Testing Laboratory to release the results of the test to the National Institute of Standards and Technology (NIST). This form should be completed by the head of the client organization responsible for the IUT.

The *Conformance Testing Log* form is used to describe the events that take place during testing. There are spaces for the date and time the event occurred, a short description of the activities and events that occurred, and a space for incident report references. If an incident requiring further description occurs, make a notation in the 'Incident Report #' column and complete a *Conformance Testing Incident Report* form.

Every file processed and transferred back to magnetic tape should be entered on the *Conformance Testing Processed Files* form. Along with the image names, include the file's storage type (either binary bit-map or encoded type I or II), tape the file is on (if there is more than one tape volume), image orientation and dimensions, and any comments you may have about the image.

The *Conformance Testing Results File* form should be completed by a team leader or supervisor. This is the client's certification that the documentation returned with the processed tape(s) is complete and accurate.

A sample packet of completed forms follows the blank forms.

3 TESTING PROCEDURE

The *Conformance Testing Log* form ("log") must be kept up to date and accurate during all phases of testing and a separate log kept for each of the major phases discussed in paragraphs 3.1-3.5. Each entry in the log should contain a brief description of the event and the name of the software in use at the time the event occurred. References to incident reports should be numbered consecutively. Each log entry does not require an incident report; incident reports are generally reserved for events which have a major impact on the conformance testing procedure or sequence, such as an error during image compression, the completion of a test run (successfully or not), a major catastrophe in the system's memory, or other event of similar magnitude.

The exact testing procedure will vary from system to system; however, the general procedure outlined below is applicable to all systems.

3.1 Initial Transfer of File Set #1

The recommended first stage of testing is the transfer of the uncompressed binary bit-map files from MIL-STD-1840 tape format to a form which the IUT's encoder/compressor can process. As the files are transferred from tape, record the file name and image

dimensions and orientation on the *Conformance Testing Specification* form. If the system has appropriate facilities, you may also provide a brief description of the image on the test specification form. Note the transfer in the log along with any error events or incidents of note in incident reports. This step should be repeated until all files in File Set #1 (bit-map) are successfully transferred, as any information garbling at this stage will affect all other operations on File Set #1.

3.2 Encoding and Compression of File Set #1

The next step is the encoding and compression of File Set #1. The encoding and compression of each individual file should be recorded in the log and incidents reported as appropriate. Note that some files may have negative compression.

3.3 Initial Transfer of File Set #2

The transfer procedure for the encoded/compressed image test set is approximately the same as that for File Set #1. The same type of information and parameters are recorded on the *Conformance Testing Specification* form and the log.

3.4 Decoding and Decompression of File Set #2

The decoding and decompression of File Set #2 (encoded) should follow basically the same format as that taken with the compression of File Set #1. Make a notation of the decoding/decompression of each individual file in the log, along with any errors or especially noteworthy incidents in incident reports. At this point, the client's tester may optionally write a short description of the image on the *Conformance Testing Specification* form. Please note that at least one image in File Set #2 may be improperly coded. It is not necessary to decompress an improperly coded image; it should not be included with the other files of File Set #2 when transferring the decompressed images back to tape. However, the incident report should document the coding error as fully as possible, e.g., line where the error was detected, nature of the coding error, etc.

3.5 Final Transfer of File Sets #1 and #2

At this point, every file in File Set #1 should have been encoded/compressed and every file in File Set #2 should have been decoded/decompressed to binary bit-map format (barring the file(s) with improper coding). These files should then be transferred back to magnetic tape as two separate documents, File Set #1 (encoded) comprising one document and File Set #2 (bit-map) comprising the other. Once again, these events should be

entered into the log, and any errors or other significant events recorded on incident reports. Note also that if your original conformance test package contained one magnetic tape, both documents should be returned on a single tape; if the conformance test package contained two tapes, then the documents should be stored on separate magnetic tapes.

As each document is stored to tape, you should enter it on the *Conformance Testing Processed Files* form.

3.6 Completion of Report Forms

The *Conformance Testing Release Authorization* and *Supplier's Declaration of Conformance* forms must be completed by an individual with the authority to authorize the release of the results of the conformance test to NIST.

The *Conformance Testing Results File* form should be completed by the conformance testing team leader, an authorized client representative, and optionally an observer designated by NIST who was present during the entire test. This form states that the returned documentation is the complete and accurate record of the testing and processing performed.

4 TEST PACKAGE RETURN

The processed tapes should be clearly marked as to their contents. You should return to the Conformance Testing Laboratory a package which includes the reel(s) of magnetic tape containing the processed images and all completed forms including: *Conformance Testing Log*, *Conformance Testing Incident Report*, *Conformance Testing Processed Files*, *Conformance Testing Results File*, and *Conformance Testing Release Authorization*. The absence or incompleteness of any portion of the test package will result in an incomplete test and a negative evaluation which will be documented in the VSR.

RASTER GRAPHICS
Conformance Testing Release Authorization

_____ hereby authorizes the
(Company Undergoing Test)
Conformance Testing Laboratory _____
to release the Validation Summary Report to the National
Institute
of Standards and Technology for general distribution. The test
is identified as: _____.
(Client Request Number)

Authorized Signature:

Name: _____

Title: _____

Date: _____

**RASTER GRAPHICS
Conformance Testing Incident Report**

Client Request Number: _____

Incident Report Number: _____

Description of Incident:

Impact of Incident Upon Test:

**RASTER GRAPHICS
Conformance Testing Results File**

Client Request Number: _____

Software Identification: _____

The undersigned certify that the material and records contained in this file are all those and only those associated with the above identified Group 4 Compression / Decompression test.

(Team Leader)

(Affiliation)

(Client Representative)

(Affiliation)

(Observer - Optional)

(Affiliation)

Supplier's Declaration of Conformance

The undersigned (client's representative) certifies that the compression/decompression processor identified below will be tested in the described environment for conformance to the Federal Information Processing Standard Publication (FIPS PUB) 150. This declaration will become part of the Validation Summary Report (VSR) that describes the testing for the processor. (Please TYPE requested information.)

Client Name: _____ Phone: _____

Address: _____

City: _____ State: _____ Zip: _____

Processor Identification: _____ Version: _____ Release: _____

Hardware: _____ Hardware Options: _____

Hardware Components Supported by the Processor: _____

Operating System: _____ Version: _____ Release: _____

Additional Supporting Software: _____

Non-supported Syntax or Known Non-conformities: _____

The undersigned also certifies that the environments described below produce results identical to those produced by the environment identified above. These environments are included based upon the criteria described in Raster Graphics Validation Policy and Procedures.

(1) Hardware: _____ Hardware Options: _____

Operating System: _____ Version: _____ Release: _____

(2) Hardware: _____ Hardware Options: _____

Operating System: _____ Version: _____ Release: _____

(3) Hardware: _____ Hardware Options: _____

Operating System: _____ Version: _____ Release: _____

SIGNED: _____ Date: _____

Typed Name: _____ Title: _____

RASTER GRAPHICS
Conformance Testing Release Authorization (SAMPLE)

Pokey Data Division
(Company Undergoing Test) hereby authorizes the
Conformance Testing Laboratory Compressor Checker, Inc.
to release the Validation Summary Report to the National
Institute of Standards and Technology for general distribution.
The test is identified as: 124C41
(Client Request Number)

Authorized Signature: Jane Doe
Name: Jane Doe
Title: VP, Operations
Date: 7/25/89

RASTER GRAPHICS
Conformance Testing Log (SAMPLE)

Client Request Number: 124C41

Person(s) Conducting Test: John Doe

Test Phase/Description: Transfer files from original
tape to on-line mass storage: File Set # 1.

<u>Date / Time</u>	<u>Activities and Event Entries</u>	<u>Incident Report #</u>
<u>7/20/89 9:00</u>	<u>Test group assembled, main points reviewed</u>	<u></u>
<u>9:05</u>	<u>Tape #1 (uncompressed images) loaded onto drive</u>	<u></u>
<u>9:06</u>	<u>MIL-transfer tape processor begins run</u>	<u></u>
<u>9:07</u>	<u>1st file (D001R001) transferred</u>	<u></u>
<u>9:08</u>	<u>2nd file (D001R001) transferred</u>	<u></u>
<u>9:09</u>	<u>3rd file (D001R002) transferred</u>	<u></u>
<u>9:10</u>	<u>4th file (D001R003) transferred</u>	<u></u>
<u>9:10</u>	<u>MIL-transfer reports all files in document transferred to disk</u>	<u></u>
<u>9:11</u>	<u>MIL-transfer halted normally, end of tape-to-system file transfer test</u>	<u></u>

**RASTER GRAPHICS
Conformance Testing Log (SAMPLE)**

Client Request Number: 124041

Person(s) Conducting Test: John Doe

Test Phase/Description: Compression of file Set #1

<u>Date / Time</u>	<u>Activities and Event Entries</u>	<u>Incident Report #</u>
<u>7/20/89 10:00</u>	<u>Images D001R001 - D001R003</u>	
	<u>viewed on monitor</u>	
<u>10:10</u>	<u>Group 4 Compressor begins</u>	
<u>10:11</u>	<u>Begin processing D001R001</u>	
<u>10:20</u>	<u>Finish D001R001 Compression</u>	
	<u>-normal</u>	
<u>10:21</u>	<u>Begin processing D001R002</u>	
<u>10:27</u>	<u>Finish D001R002 Compression</u>	
	<u>-normal</u>	
<u>10:28</u>	<u>Begin processing D001R003</u>	
<u>10:30</u>	<u>Buffer region overflow &</u>	<u>IR # 1</u>
	<u>Program crashes</u>	
<u>10:33</u>	<u>Program's memory management</u>	
	<u>modifications finished</u>	
<u>10:50</u>	<u>Test of program complete</u>	
<u>10:55</u>	<u>Begin processing D001R003 again</u>	
<u>11:25</u>	<u>Finish D001R003 compression-normal</u>	
<u>11:30</u>	<u>Program halts normally,</u>	
	<u>end of test (set #1)</u>	

**RASTER GRAPHICS
Conformance Testing Log (SAMPLE)**

Client Request Number: 124C41

Person(s) Conducting Test: John Doe

Test Phase/Description: Decompression of File Set #2.

<u>Date / Time</u>	<u>Activities and Event Entries</u>	<u>Incident Report #</u>
7/21/89 10:00	Group 4 Decompressor begins run	
10:01	Begin processing D002 R001	
10:17	Finish D002 R001 Decompression	
	- normal	
10:18	Begin processing D002 R002	
10:24	Finish D002 R002 Decompression	
	- normal	
10:25	Begin processing D002 R003	
10:27	Program reports D002 R003	IR #2
	improper coding & exits	
10:28	Program invoked on D002 R003	
	with full diagnostics	
10:33	Program reports improper	IR #3
	coding at line 103, line	
	runs past end of image	
10:34	Program halted normally,	
	end of test (Set #2)	

RASTER GRAPHICS (SAMPLE)
Conformance Testing Incident Report

Client Request Number: 124C41

Incident Report Number: IR # 1

Description of Incident:

Group 4 Compression program reported a buffer memory region overflow. This was apparently due to negative compression of the image to an unexpected degree.

Impact of Incident Upon Test:

Negligible. Error corrected by increasing memory buffer region available to the program. No other modifications required.

RASTER GRAPHICS (SAMPLE)
Conformance Testing Incident Report

Client Request Number: 124C41

Incident Report Number: IR #2

Description of Incident:

Group 4 Decompressor program reported an improper line encoded while decompressing Group 4 image D002R003. Program then halted execution.

Impact of Incident Upon Test:

Indeterminate at this time. Most probable is that improper coding in image is detected. Program will be run with full diagnostics in operation to determine whether error is in image and/or in program.

RASTER GRAPHICS (SAMPLE)
Conformance Testing Incident Report

Client Request Number: 124C41

Incident Report Number: IR #3

Description of Incident:

Group 4 Decompressor program reported image encoding problem at line 103 of image. Program then suspended operation and was halted normally by system operator.

Impact of Incident Upon Test:

Program determined improper coding of the line. Error was found to be located in the image coding, not the software. This indicates successful completion of this test segment.

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NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY
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11. ABSTRACT (A 200-WORD OR LESS FACTUAL SUMMARY OF MOST SIGNIFICANT INFORMATION. IF DOCUMENT INCLUDES A SIGNIFICANT BIBLIOGRAPHY OR LITERATURE SURVEY, MENTION IT HERE.)

This publication describes the guidelines for establishing and managing raster graphics validations which include both conformance testing and the issuing of a certificate of validation. Raster graphics validation supports the National Institute of Standards and Technology (NIST) initiative to validate products professing to support Federal Information Processing Standard (FIPS) Publication 150, Planned FIPS (ODA Raster DAP), Department of Defense (DoD) Military Standard MIL-STD-1840, and DoD Specification MIL-R-28002. This publication is divided into three functional documents needed to support raster graphics validation: Policy and Procedures; Description of Requirements; and Instructions and Forms. The Policy and Procedures document provides the operating policy and procedures that are to be followed in administering validations. The Description of Requirements document describes the conformance testing environment including the testing system software and procedure for executing the conformance testing system. The Instructions and Forms document contains the instructions, forms, and information necessary for a testing laboratory to test and report on a raster graphics product.

12. KEY WORDS (6 TO 12 ENTRIES; ALPHABETICAL ORDER; CAPITALIZE ONLY PROPER NAMES; AND SEPARATE KEY WORDS BY SEMICOLONS)

CALS, conformance testing, conformance testing instructions, conformance testing forms, conformance testing laboratories, raster graphics, testing procedures, testing requirements, validation, validation policy.

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